EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mark S. Svat on 08/11/08.

The application has been amended as follows:

TITLE: Amended Title: "Automated identification of carbohydrates in mass spectra"

IN SPECIFICATION:

A.   Substitute "dictionary" (of cartoons) to "library" through the whole specification.

B.   In [0031] the first line after "an initial set of" replace [cartoons] with -- cartoon archetypes --; and after "From these initial" insert -- cartoon --.

IN CLAIMS:

Cancel claim 21.

1. (Currently Amended) A computerized method for assigning glycans to mass peaks in mass spectra of said glycans identifying peaks corresponding to glycans from a mass spectrum, said method, comprising:

receiving at least one mass spectrum of at least one glycan spectrum from a mass spectrometer, wherein said at least one glycan spectrum includes at least one of said peaks having in said at least one mass spectrum corresponds to a measured mass of said at least one glycan;

constructing a monosaccharide set table for possible glycans, wherein at least one row represents the monosaccharide composition of at least one possible glycan;

applying a set of rules generated for the at least one glycan based on experimental and/or biosynthetic conditions, which limit the number of the potential glycans;

eliminating rows from the monosaccharide set table which do not satisfy said set of rules;

calculating at least one theoretical mass for at least one remaining glycan in the monosaccharide set table; and,

assigning at least one glycan to the at least one peak by comparing said measured mass to said theoretical mass.

~~assigning glycan identifications to said peaks by comparing said measured mass~~

~~to known masses of a customized set of possible glycans in a monosaccharide set~~

~~table, wherein a rule set is aptied to form the customized set of possible glycans in the~~

~~monosaccharide set table;~~

~~combining said peak assignments with biosynthetically plausible cartoons which~~

~~are symbolic representations of the glycans in the monosaccharide table;~~

~~creating a glycan report consisting of the cartoon representations of each corresponding peak;~~

~~and~~

~~reporting to a user the combined peak assignments and cartoons in the form of the glycan report~~.

2. (Previously Presented) The method ~~for identifying peaks corresponding to glycans~~ according to claim 1, ~~further comprising constructing the monosaccaharide set table having a plurality of~~ ~~monosaccharides comprising isomers of the customized set of possible glycans.,~~ wherein assigning at least one glycan to the at least one peak further comprises annotating said at least one peak with cartoon symbols representing isomeric structures for said at least one glycan, with the cartoons generated from cartoon archetypes.

3. (Currently Amended) The method according to claim 1, wherein the step of applying the set of rules ~~for identifying peaks corresponding to glycans according to claim 2, wherein constructing~~ ~~said monosaccharide set table~~ comprises:

~~constructing a glycan/monosaccharide set chart, wherein each row represents a~~

~~set of monosaccharides, further representing a set of possible glycan isomers;~~

~~applying combination ranges for a mass of said monosaccharides;~~

customizing the set of rules,

~~developing said rule set from an initial set of archetypes entered into an associated directory of~~

~~the cartoons,~~

wherein said set of rules specify monosaccharide combination limitations~~;~~

~~eliminating each of said monosaccharide rows not satisfying said rule set; and~~

~~computing glycan isotope frequency based on isotope frequencies for H, C, O, and N~~

~~and glycan isomer frequency~~.

4. (Amended) The method ~~for identifying peaks corresponding to glycan~~s according to claim 1,

wherein assigning glycan identifications comprises:

defining matches between theoretical masses and spectrum peaks which have a high confidence;

obtaining a tolerance interval for matching from the defined matches,

calibrating spectra using said tolerance interval.

~~calibrating said received glycan spectrum by at least defining an acceptable~~

~~tolerance based on the tolerance of the high-confidence peak identifications; and~~

~~matching isotopes from said monosaccharide set table to said peaks within the~~

~~said glycan spectrum.~~

5. (Amended) The method ~~for identifying peaks corresponding to~~

~~glycans~~ according to claim 4, wherein the method comprises a step of a preliminary calibration

of raw spectra by a user. ~~calibrates said received glycan spectrum~~.

6. (Amended) The method ~~for identifying peaks corresponding to glycan~~s according to claim 4,

wherein ~~matching the isotopes with said peaks comprises~~ <u>constructing the monosaccharide set</u>

<u>table for potential glycans comprises calculating an isotope envelope for each potential glycan;</u>

<u>and wherein defining matches between theoretical masses and spectrum peaks</u> comprises

selecting the isotope with the highest expected frequency <u>from each of said isotope envelopes</u> for

each said ~~monosaccharide~~ <u>potential glycan;</u>

searching said spectrum for a peak within an acceptable tolerance of said isotope; and

selecting said peak having the best isotope envelope.

In Claim 7: delete [for identifying peaks corresponding to glycans], and after "further

comprising" insert -- a step of --.

8. (Amended) The method ~~for identifying peaks corresponding to glycans~~ according to claim 7,
wherein ~~performing said quality assessment comprises:~~
~~measuring proximity of said measured mass for a selected peak to the theoretical~~
~~mass of the glycan;~~
~~computing~~ computation of isotope envelopes occurs for isotopically labeled or nonlabeled
~~isotopes~~ glycans ~~and~~
~~examining the peak height at a peak height mass minus one position~~.

9. (Original) The method ~~for identifying peaks corresponding to glycans~~
according to claim 1 ~~4~~, wherein the step of receiving at least one mass spectrum of at least one
glycan comprises receiving a plurtality of mass spectra for said glycan, and wherein additional
information is obtained from said plurality of spectra from their comparison.
~~further comprising performing spectrum combination, wherein said~~
~~spectrum combination includes combining the information from a plurality of spectra~~.

10. (Amended) The method ~~for identifying peaks corresponding to glycans~~ according to claim 1,
further comprising the step of reporting obtained peak assignments, wherein ~~reporting of~~ said
peak assignments comprise~~s~~ at least one family report, wherein the family comprises a sequence
of spectrum peaks, wherein the label for each succeeding peak contains at least one more
monosaccharide than the label of the preceding peak.

11. (Amended) The method ~~for identifying peaks corresponding to glycans~~ according to claim 1,
further comprising creating a library of cartoons for the potential glycans generated from
archetype cartoons using the set of rules, the library of cartoons containing cartoons representing
structural isomers for each potential glycan.
~~wherein said glycan identifications comprise a plurality of cartoons, wherein said cartoons~~
~~comprise symbolic representations of isomers in said monosaccharide table~~.
Cancel Claim 21.

22. (Amended) ~~A~~ The method ~~for identifying peaks corresponding to glycans from a mass spectrum with~~ according to claim 2, further comprising an automatic computerized estimation of accuracy of glycan assignments~~, said method~~ by

~~customizing a database of possible glycans in consideration of the type of sample to be tested;~~

~~processing the sample of at least one glycan through a mass~~

~~spectrometer, wherein a mass of the sample is measured;~~

~~identifying the at least one glycan present in the sample by comparing the~~

~~measured mass of the sample to known masses of a customizable set of possible~~

~~glycans in a customized monosaccharide table wherein a rule set is applied to form the~~

~~customized monosaccharide table;~~

~~labeling the peaks in the resulting spectra with cartoons of the represented~~

~~glycans;~~

assigning a confidence score relating to the accuracy of the glycan assignment;

creating a glycan report consisting of the cartoon representation of each corresponding peak with the assigned confidence score; and

reporting to a user the combined peak assignments and cartoons in the form of a glycan report.

In Claims 23-26 delete [for identifying peaks corresponding to glycans].

In Claim 27: replace [an assignment is] with -- the assignments are--.

30. (New).   The method according to claim 1, wherein constructing the monosaccharide set table for potential glycans comprises calculating isotope abundance for atoms H, C, O, and N, and wherein the step of comparing the measured and theoretical masses takes into account the calculated isotope abundance.

31. (New).   The method according to claim 1, wherein constructing the monosaccharide set table for each potential glycan comprises generating all possible combinations of the monosaccharides using predefined ranges for minimum and maximum number of specific monosaccharides for the potential glycan.

32. (New). The method according to claim 1, wherein the step of assigning at least one glycan to the at least one peak further comprises determining the confidence of the peak assignment by selecting the highest peak with an isotope envelope that closely matches its theoretical value.

The following is an examiner's statement of reasons for allowance: the prior art does not disclose or fairly suggest applying a set of rules to theoretically possible glycans and computer generating mass spectra based on these rules in order to assign glycans to peaks in experimental mass spectra.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yelena G. Gakh, Ph.D. whose telephone number is (571) 272-1257. The examiner can normally be reached on 9:30 am - 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill A. Warden can be reached on (571) 272-1267. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Yelena G. Gakh/

Primary Examiner, Art Unit 1797

4/14/2008